

REMARKS

The present amendment is submitted in response to the Office Action dated May 6, 2003, which set a three-month period for response, making this amendment due by August 6, 2003.

Claims 1-18 are pending in this application.

In the Office Action, the drawings were objected to as failing to comply with 37 CFR 1.84(p)(4). The specification and claims 3, 5, and 9 were objected to for various informalities. Claims 1, 8 and 15 were rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and/or use the invention. Claims 9-15, 17, and 18 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite. Claims 1, 5-7, 11-12, and 16-18 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,528,093 to Adam et al. Claims 1, 2, and 4 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,613,096 to Michenfelder et al. Claim 8 was rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,201,326 to Klappenbach. Claims 3, 13, and 15 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,528,093 to Adam et al in view of U.S. Patent No. 6,525,938 to Chen. Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Michenfelder et al in view of U.S. Patent No. 6,127,752 to Weisler. Claim 10 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Adam et al in view of U.S. Patent No.

6,555,943 to Walther et al. Claims 13 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Michenfelder in view of Chen, and in further view of Walther.

In this amendment, amendments to the drawing were not necessary. Rather, errors in the use of reference numerals in the specification were corrected to address the objections to the drawings and specification.

The specification was also amended to address the objections noted on pages 2 of the Office Action. The term ASIC was defined as "Application-Specific Integrated Circuit".

Regarding the further objection to the specification relating to the use of the brush holder as a support for the printed circuit board, the term "brush holder 18" is a common term in DC electric motors for the plastic part, on which the brushes are attached. From Figure 2, in connection with the description on page 6, second paragraph, it can be understood that the brush holder 18 has three areas: the flattened plastic ring 20, a web 26 parallel to the sides of the ring, and a connector plug 28 supported by the web 26. The brush holder 18 might better be designated as a "brush holder element". However, this portion of the specification has been amended to add that the brush holder 18 has a receptacle for holding the printed circuit board.

With regard to the rejection of claim 1 as non-enabled under Section 112, first paragraph, the term "control electronics" designates generally all components that serve for electronic control of the electric motor. Such control electronics has a printed circuit board 14, which includes a concrete switching

arrangement on a substrate. This is commonly known in the art. However, the specification has been amended to add this brief definition for the purposes of clarification.

Regarding the rejection of the claims under Section 12, second paragraph, the Applicants have amended the claims to address each of the noted instances of indefinite language.

Turning now to the substantive rejection of the claims, claim 1 has been amended to further define "an armature shaft accommodated in the transmission housing, a brush holder (10) with a plastic ring (20), wherein the armature shaft projects through the plastic ring (20), and control electronics located in the transmission housing (10), characterized in that the control electronics comprises at least one, printed circuit board (14) located in the transmission housing (10), wherein said at least one printed circuit board is essentially rectangular, wherein said printed circuit board is separate from the brush holder (18) and is formed to be removable from the brush holder (18), and wherein the printed circuit board extends in a plane parallel to the armature shaft (15)."

Support for these limitations can be found in Figures 6a, 6b, and 7b, as well as in the disclosure on pages 6-7.

In addition, new claims 19 and 20 have been added. New claim 19 defines that the printed circuit board extends over the axial length of the commutator 16 and projects beyond the commutator by at least 1.5 times (the features of original claim 8).

New claim 20 removes the limitation that the circuit board is rectangular, includes the above limitations relating to the extension of the circuit board over the axial length of the commutator, and also includes the features of original claim 16, which are shown in Figures 7a and 7b, relating to the insertion of the circuit board into an opening on the transmission housing.

Amended claim 1, along with new claims 19 and 20, each define a patentably distinct set of features over the cited references.

The patent to Adam shows an electric motor with a transmission, an armature shaft, and ring-shaped brush holder, through which the armature shaft projects, and a printed circuit board 4, which is arranged at least partially in a transmission housing. With Adam, the circuit board 4 is formed to operate simultaneously as the brush holder, which includes receptacles 4.7 for the brushes 4.5. The circuit board 4 formed as the brush holder element is arranged perpendicular to the armature shaft 7.

In contrast, the present invention includes a brush holder element 18, which is arranged perpendicular to the armature shaft 15, but, in addition, to the brush holder element 18 has an additional, separately formed circuit board 14, which extends parallel to the armature shaft. The circuit board 14 in the present invention has no receptacles for the brushes, rather is accommodated by the brush holder element itself 18.

The patent to Michenfelder describes an electric motor, in which a brush holder is mounted radially to the armature shaft. The brush holder 40 has no plastic ring, since such a ring only can be mounted axially to the armature shaft.

Likewise, Michenfelder disclose no circuit board, that is, a substrate made of plastic with integrated switching circuits; rather, Michenfelder discloses only a punched grid, which is integrated in the transmission housing. Such a punched grid in the transmission housing covers also is not suited for receiving a position detection or ASIC components.

Klappenbach likewise discloses an electric motor with a completely different assembly concept than that of the present invention. The brushes are arranged on a circuit board by means of a brush holder, so that the brushes are radially mounted here. Klappenbach does not render obvious a brush holder element with a plastic ring, through which the armature shaft projects, since the brush holder is arranged together with the circuit board first in the housing shell and subsequently can be mounted. In this connection, the brush holder is accommodated by the circuit board, so that in no way is the circuit board formed by the brush holder.

The patent to Chen does not disclose a brush holder, and thus, also no plastic ring, through which the armature shaft projects. Thus, the practitioner receives no teaching to arrange the circuit board in a receptacle of a brush holder. In addition, Chen shows no transmission housing, in which the circuit board could be arranged.

The patent to Weisler shows a brush holder with a plastic ring, through which an armature shaft projects, however, Weisler shows no circuit board. Thus, the practitioner again would receive no suggestion to arrange the circuit

board in a receptacle of the brush holder, or to arrange the circuit board in a plane parallel to the armature shaft.

The reference to Walther describes a transmission motor, which has a brush holder plate with a plastic ring 14, but no circuit board. The interference elements 23 are directly accommodated, for example, by the brush holder plate 14, so that the practitioner likewise would receive no suggestion to integrate a circuit board in the brush holder plate perpendicular to the armature shaft.

New claim 19 differs from amended claim 1, in that the circuit board extends over the axial length of the commutator 16 and projects beyond the commutator by at least 1.5 times. For this feature, the same is true for the feature of amended claim 1: that the circuit board extends in a plane parallel to the armature shaft, so that also new claim 19 is novel and non-obvious over the cited references. With Klappenbach, a circuit board is disclosed which might extend by 1.5 times over the axial length of the commutator. However, in Klappenbach, the brush holder is mounted for receiving the brushes on the circuit board, which then is mounted together with a housing shell radially on the armature shaft. Such an assembly concept, however, is not comparable with the features of new claim 19, in which a brush holder with a plastic ring is arranged in the transmission housing, such that the armature shaft with the commutator extends through the plastic ring.

Thus, this reference actually teaches away from the present invention and the other references, which show a brush holder with a plastic ring, so that a

practitioner would not be motivated to combine the Klappenbach reference with the other cited references to achieve the present invention.

With new claim 20, the feature of the rectangular shape of the circuit board is omitted and substituted by the feature of the radial opening in the transmission housing, in which the circuit board can be inserted. In the Office Action, it is stated that Adam discloses the subject matter of original claim 16. However, the transmission housing in Adam shows no opening radial to the armature shaft, rather only an axial opening, as long as the transmission housing is not yet mounted on the pole top. However, the circuit board cannot be inserted radially to the armature shaft into an opening of the transmission housing, since here, the circuit board has a ring, through which the armature shaft projects in its axial mounting. The other cited references likewise disclose no radial opening in the transmission housing. Thus, the practitioner is provided with no suggestion of radially inserting a circuit board, in order to position the circuit board in its working position relative to the armature shaft.

For the reasons set forth above, the Applicants respectfully submit that claims 1-20 are patentable over the cited references. The Applicants further request withdrawal of the rejections under 35 U.S.C. 102 and 103 and reconsideration of the application as herein amended.

In light of the foregoing arguments in support of patentability, the Applicants respectfully submit that this application stands in condition for allowance. Action to this end is courteously solicited.

Should the Examiner have any further comments or suggestions, the undersigned would very much welcome a telephone call in order to discuss appropriate claim language that will place the application into condition for allowance.

Respectfully submitted,



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